

Applications of Earth Remote Sensing for Identifying Tornado and Severe Weather Damage

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AGU Fall Meeting 2015

IN32A-04

IN32A: Near Real Time Data for Earth Science and Space Weather Applications II



Background

- Following the April 27, 2011 severe weather outbreak across the southeastern U.S., the NASA SPoRT team provided MODIS and ASTER imagery to National Weather Service (NWS) forecast offices in Alabama
 - Imagery was used to refine and adjust some tornado tracks, particularly those that crossed CWA boundaries or were in areas with limited road access
- SPoRT was awarded a NASA Applied Science: Disasters “Feasibility” award to pursue inclusion of Earth remote sensing imagery and derived products within the NOAA/NWS Damage Assessment Toolkit

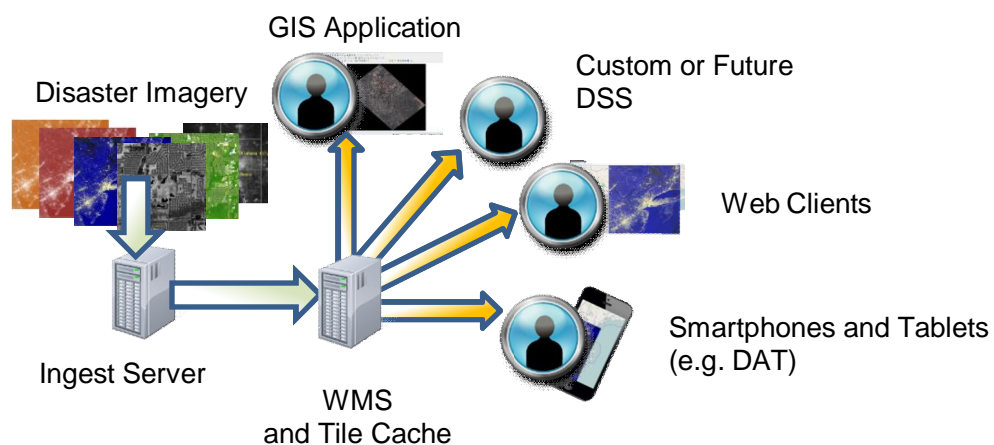
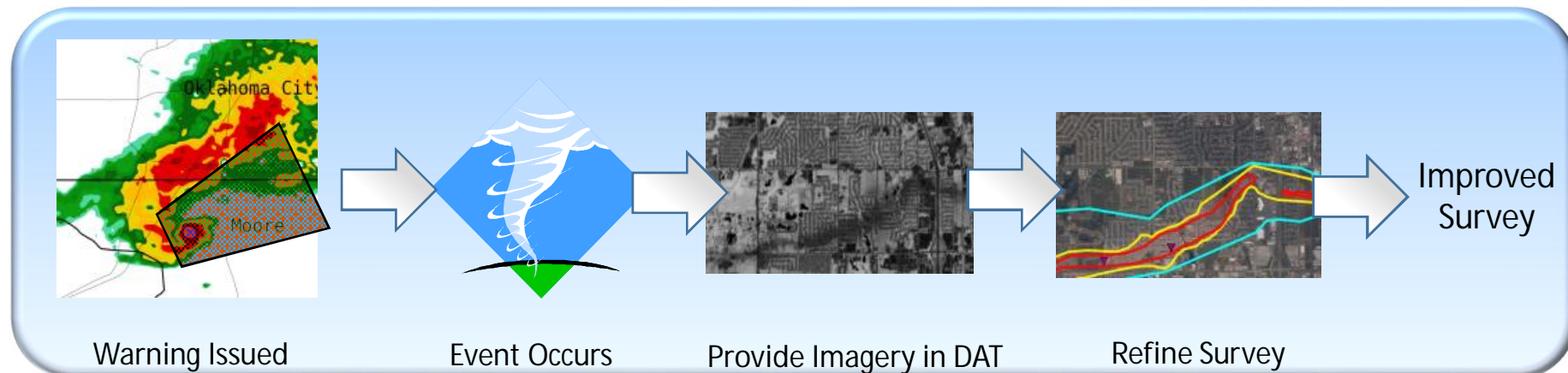


Damage Assessment Toolkit

- NOAA/NWS Damage Assessment Toolkit (DAT)
 - The DAT is a smartphone, tablet, and web-based framework for acquiring, editing, and publishing storm survey information.
 - Users can acquire geotagged photos and other information, assess storm damage and intensity, and log for further review at their office. Information collected provides additional spatial data regarding tornado damage, extent, and intensity.
- Through the NASA Applied Science award, SPoRT and NOAA/NWS collaborate to establish a Web Mapping Service and data feeds that provide satellite imagery and products as viewable data layers.



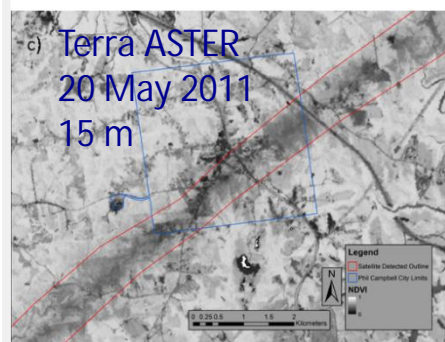
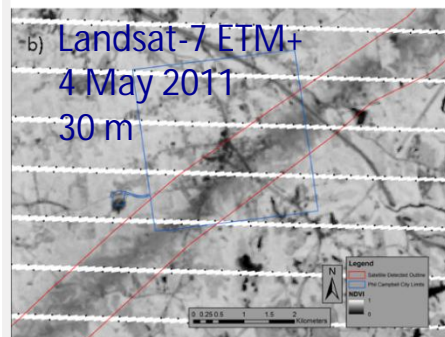
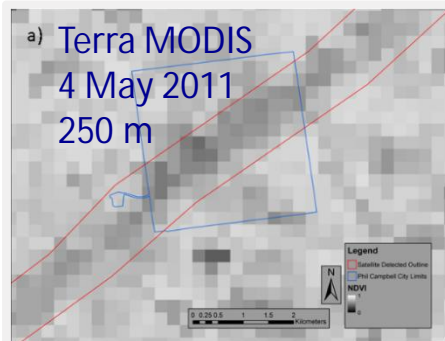
Data Use Case And Dissemination



Imagery Resolution

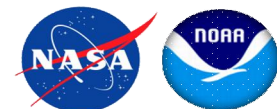
Affects Detectability of Damage Indicators

**Increases in Spatial Resolution Improves
Detection Capabilities**



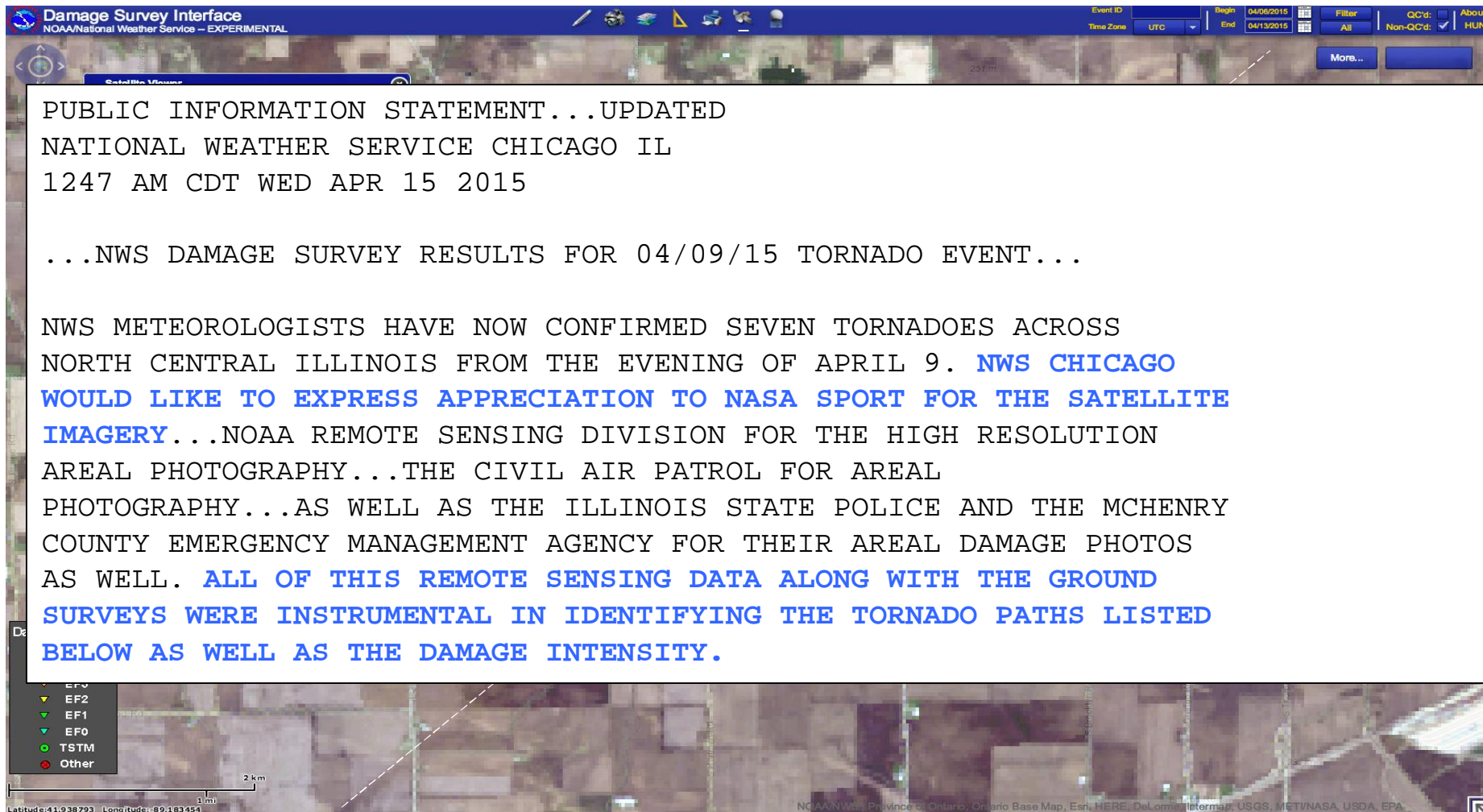
Reference: Molthan, A. L., J. R. Bell, T. A. Cole, and J. E. Burks, 2014: Satellite-based identification of tornado damage tracks from the 27 April 2011 severe weather outbreak. *J. Operational Meteor.*, 2 (16), 191–208.

Tornado Near Rochelle, IL April 9, 2015



Tornado Near Rochelle, IL

April 9, 2015



Damage Survey Interface
NOAA/National Weather Service - EXPERIMENTAL

Event ID: [blank] Begin: 04/09/2015 Filter: All QC'd: [checked] About: HUN
Time Zone: UTC End: 04/13/2015 Non-QC'd: [checked]

Satellite View

PUBLIC INFORMATION STATEMENT...UPDATED
NATIONAL WEATHER SERVICE CHICAGO IL
1247 AM CDT WED APR 15 2015

...NWS DAMAGE SURVEY RESULTS FOR 04/09/15 TORNADO EVENT...

NWS METEOROLOGISTS HAVE NOW CONFIRMED SEVEN TORNADOES ACROSS NORTH CENTRAL ILLINOIS FROM THE EVENING OF APRIL 9. **NWS CHICAGO WOULD LIKE TO EXPRESS APPRECIATION TO NASA SPORT FOR THE SATELLITE IMAGERY**...NOAA REMOTE SENSING DIVISION FOR THE HIGH RESOLUTION AREAL PHOTOGRAPHY...THE CIVIL AIR PATROL FOR AREAL PHOTOGRAPHY...AS WELL AS THE ILLINOIS STATE POLICE AND THE MCHENRY COUNTY EMERGENCY MANAGEMENT AGENCY FOR THEIR AREAL DAMAGE PHOTOS AS WELL. **ALL OF THIS REMOTE SENSING DATA ALONG WITH THE GROUND SURVEYS WERE INSTRUMENTAL IN IDENTIFYING THE TORNADO PATHS LISTED BELOW AS WELL AS THE DAMAGE INTENSITY.**

Legend:
EF0
EF2
EF1
EF0
TSTM
Other

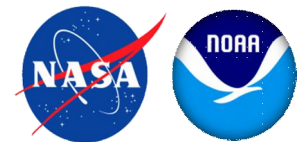
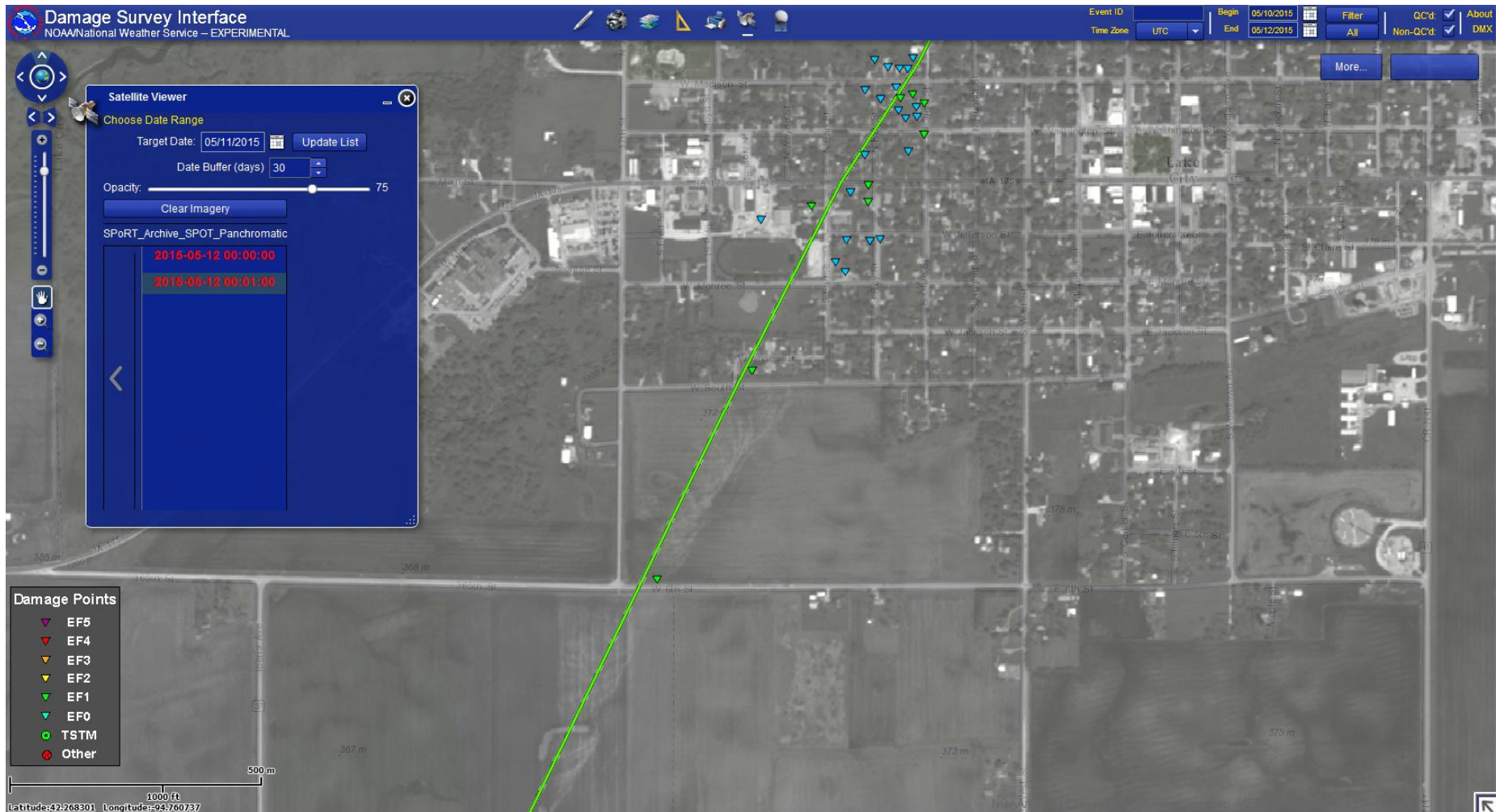
Latitude: 41.938793 Longitude: -89.183454

NOAA/NWS Province of Ontario, Ontario Base Map, Esri, HERE, DeLorme, Intermap, USGS, MET/NASA, USDA, EPA

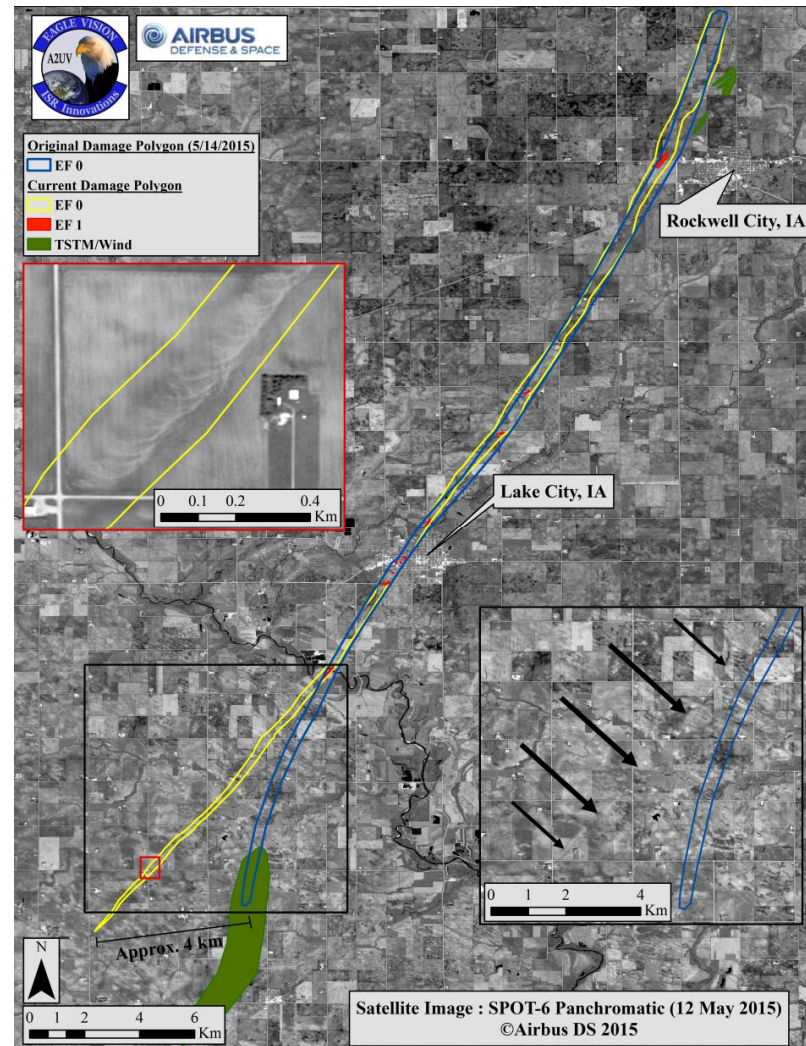


Tornado Near Lake City, IA

May 10, 2015

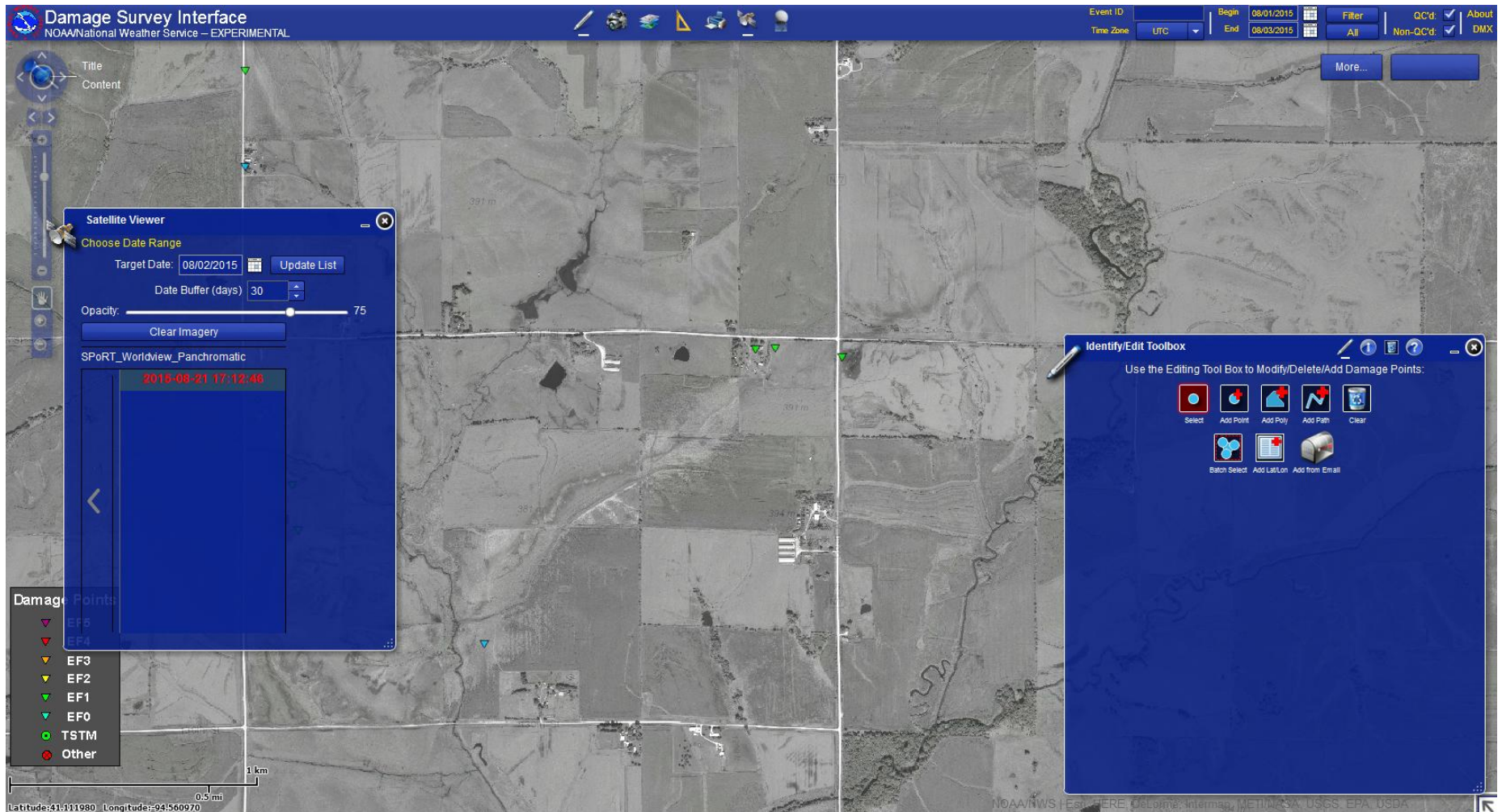


Track updated based on imagery



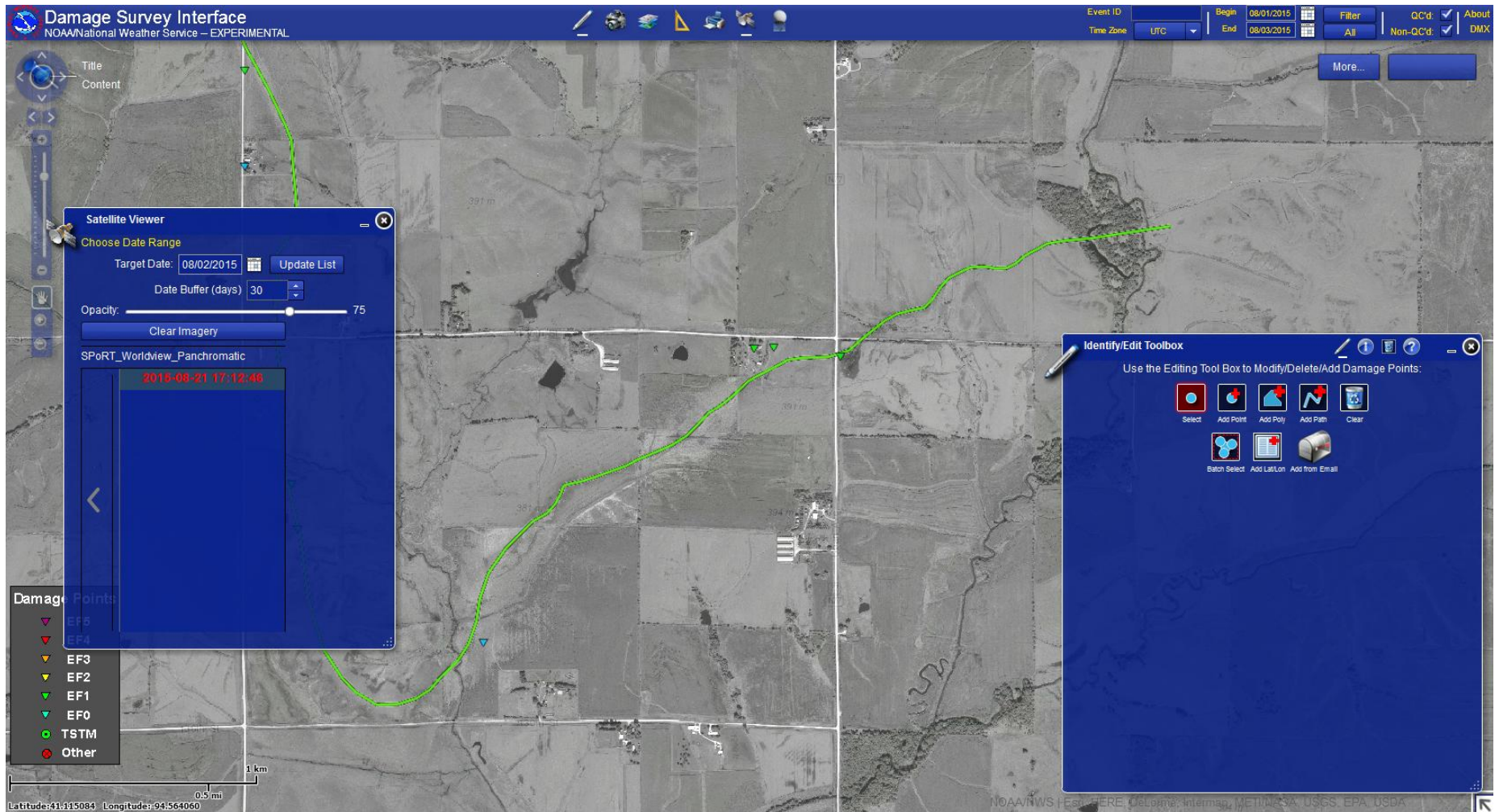
Tornado Near Williamson, IA

August 2, 2015



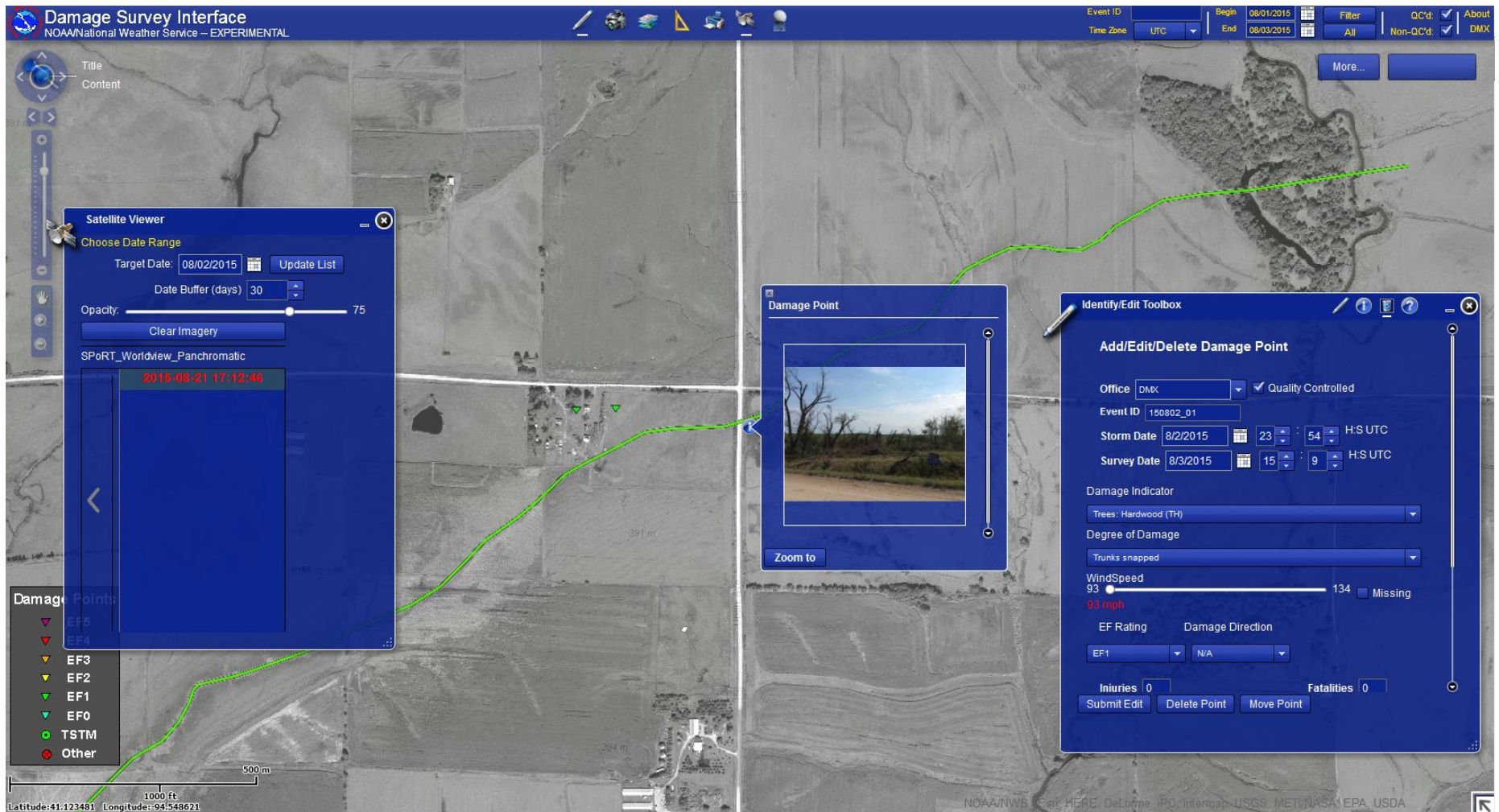
Tornado Near Williamson, IA

August 2, 2015

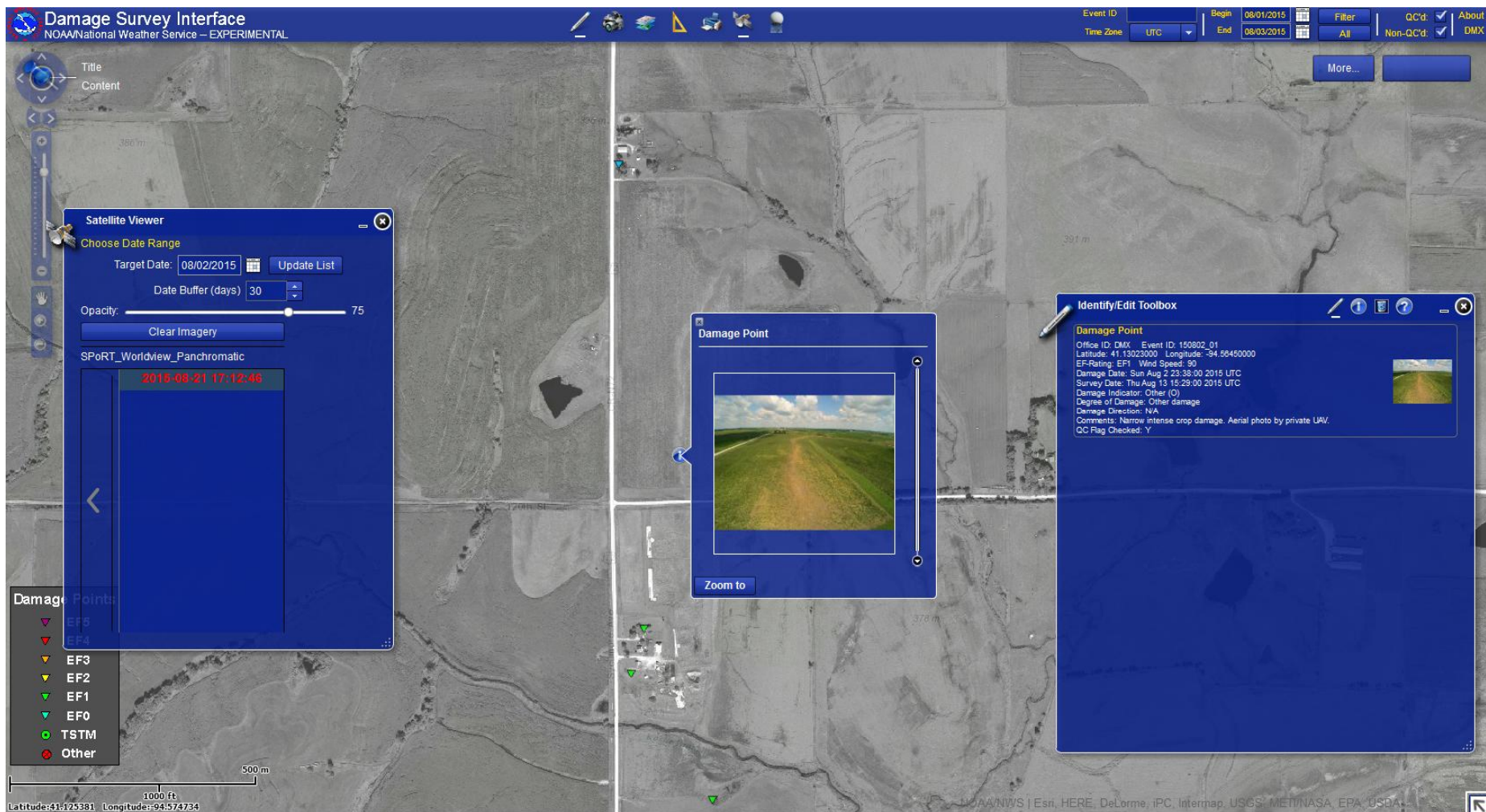


Tornado Near Williamson, IA

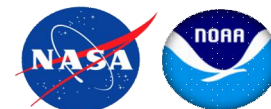
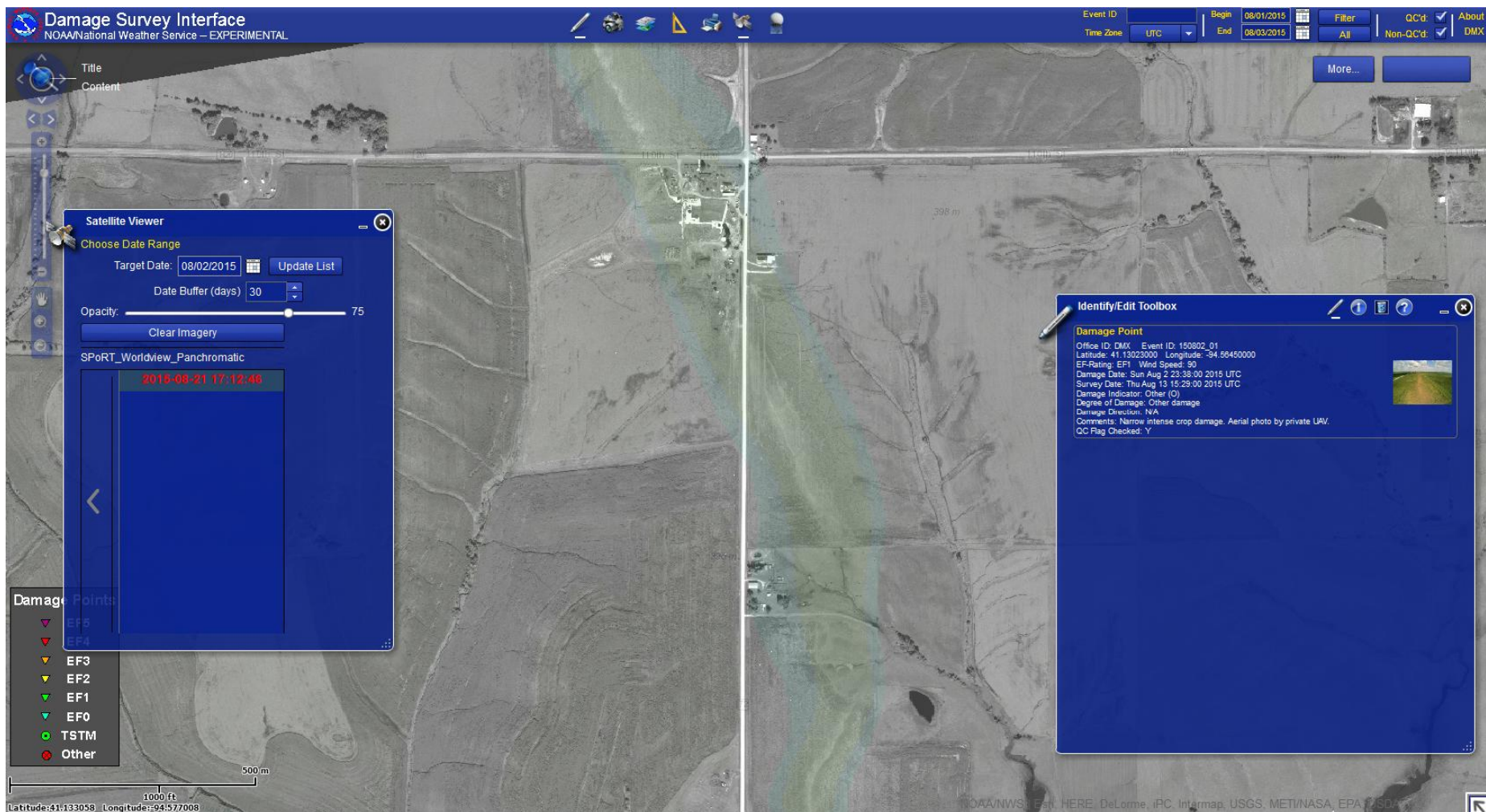
August 2, 2015



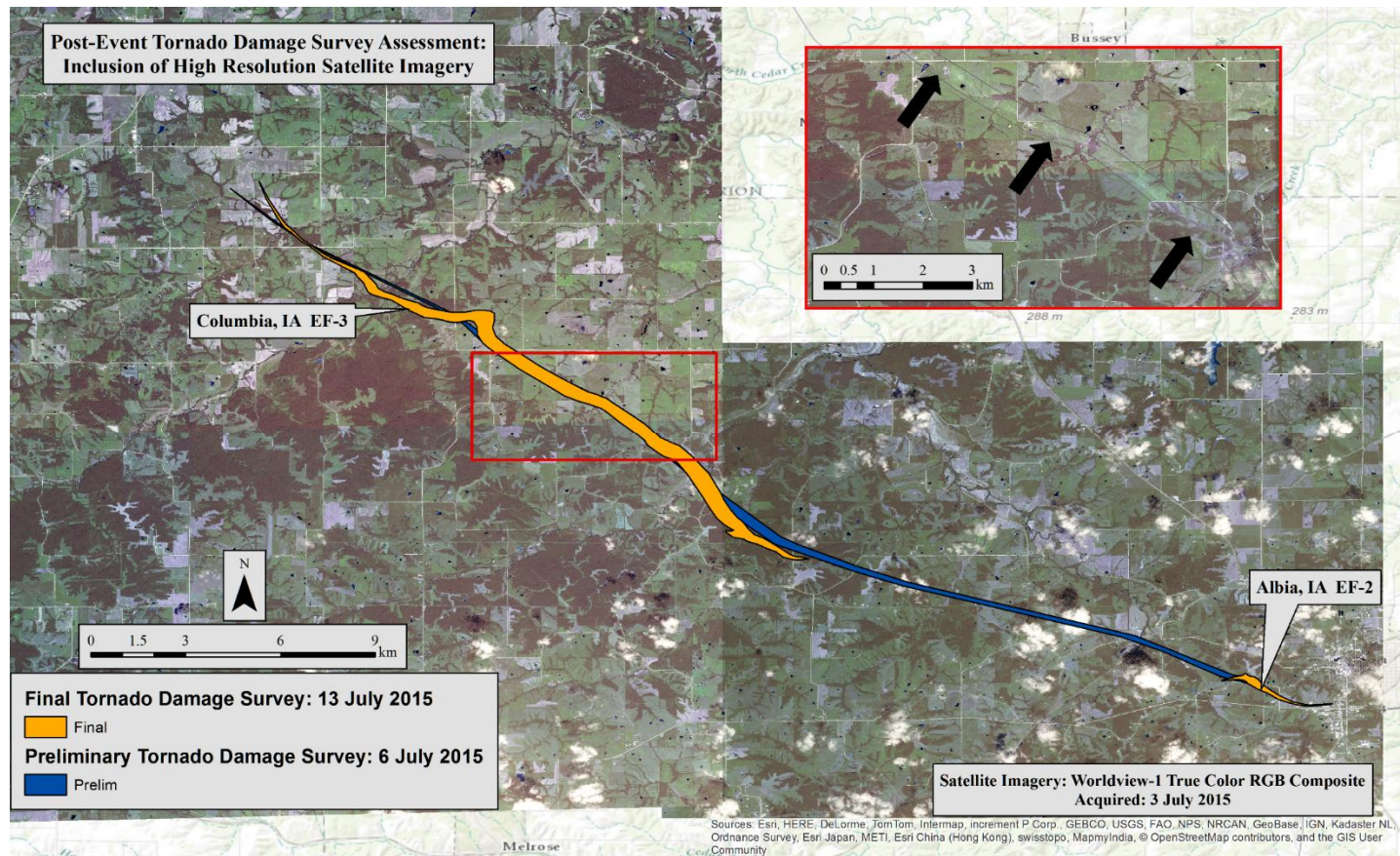
Tornado Near Williamson, IA August 2, 2015



Tornado Near Williamson, IA August 2, 2015



Track updated based on imagery



Imagery from Worldview-1 (in collaboration with USGS) was delivered to the NWS Damage Assessment Toolkit and used to refine a tornado track, shifting from a single, long track to two separate tracks. Final tracks (orange) were noted for an EF-2 and EF-3 maximum intensity tornado.



Questions?
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Kevin Skow from the NWS, and Rynn Lamb and Brenda Jones of USGS/EROS

